

NYASALAND PROTECTORATE



Annual Report
of the
Department of Agriculture
1939

1940:

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Report of the Director of Agriculture.

PART I.—AGRICULTURE IN NYASALAND.

WEATHER CONDITIONS.

1. Weather conditions during the 1938-39 season were rather unsatisfactory especially in the Southern Province where rainfall was excessive in December, January and March. In the latter month high winds did considerable damage to grain crops in the Chikwawa and Lower Shire districts, and very cold mid-season spells, with at least one frost, constituted a severe set-back to the wheat crop in the Dedza highlands.

2. The total rainfall for the six wet months and the six dry months are shown in the accompanying table.

Station	Zone	Total rainfall November 1, 1938, to April 30, 1939, Inches		Normal for six wet months Inches		Total rainfall May 1 to October 31, 1939, Inches		Normal for six dry months Inches	
Port Herald Experimental Station	A	...	45.73	...	28.8	...	3.66	...	3.2
Chikwawa	...	...	34.61	...	29.7	...	6.96	...	2.3
Cholo	B	...	54.01	...	48.8	...	11.48	...	8.1
Makwasa	...	...	46.81	...	46.8	...	5.23	...	4.4
Mlanje	C	...	80.24	...	66.6	...	15.03	...	14.5
Chitakali	...	...	49.01	...	65.6	...	19.55	...	12.1
Thornwood	...	...	57.89	...	67.8	...	17.99	...	11.6
Ruo	...	...	55.56	...	53.7	...	18.24	...	6.3
Glenorchy	...	...	57.46	...	56.2	...	14.69	...	10.1
Lujeri	...	...	84.60	...	76.3	...	27.18	...	14.3
Nalipiri	D	...	51.80	...	51.9	...	17.77	...	11.0
Blantyre	E	...	42.17	...	39.9	...	4.55	...	3.3
Chiradzulu Boma	...	...	37.36	...	40.0	...	2.50	...	2.5
Nasonia	G	...	44.39	...	36.9	...	5.91	...	1.9
Zomba Experimental Station	H	...	55.93	...	46.8	...	5.78	...	4.6
Zomba Plateau	...	...	72.40	...	—	...	13.93	...	—
Zomba Police Headquarters	...	...	45.44	...	41.9	...	2.29	...	1.8
Mwanza	K	...	40.35	...	37.2	...	8.09	...	.6
Liwonde	L	...	38.05	...	31.7	...	2.65	...	1.1
Namwera	M	...	39.29	...	42.2	...	.80	...	.3
Chipunga	...	...	39.78	...	35.0	...	1.48	...	.8
Fort Johnston	N	...	35.71	...	29.4	...	5.84	...	1.2
Ncheu	P	...	41.12	...	37.0	...	2.21	...	.9
Likuni	S	...	41.61	...	32.9	...	1.21	...	1.5
Lilongwe	...	...	33.69	...	32.7	...	.38	...	.8
Dowa	T	...	37.52	...	33.1	...	1.00	...	.7
Fort Manning	...	...	41.84	...	39.8	...	3.12	...	2.5
Domira Bay	U	...	35.34	...	31.0	...	1.27	...	.1
Dedza	V	...	44.71	...	39.7	...	1.50	...	2.2
Kasungu	X	...	33.66	...	29.1	...	.44	...	.3
Mzimba	...	...	35.14	...	31.7	...	.55	...	.2
Kota Kota	Y	...	50.02	...	48.2	...	3.61	...	2.0
Chinteché	Z	...	59.47	...	62.9	...	6.22	...	5.1
Karonga	...	...	32.65	...	52.3	...	.60	...	2.8

PRODUCTION AND EXPORT.

3. European production and acreage of the principal crops during the year are given in the following table:

	Acres	Yields		Acres	Yields
Tea	18,018	11,337,540 lb.	Sisal	1,437	4,528 cwt.
Coffee	365	238 cwt.	Cotton (lint)	147	218 cwt.
Tobacco	10,407	3,404,128 lb.	Rubber	1,300	1,239 cwt.

4. Native production and numbers of growers of the two principal crops, *viz.* cotton and tobacco, are shown below :

	No. of growers	Amount sold
Cotton (seed cotton)	30,300	2,455 tons
Tobacco	59,235	4,955 tons

5. The exported amounts and values of the various items of agricultural produce and of raw materials were as follows.

					Amount					Value
										£
Chillies and Capsicums	...	...	...	...	7,852	lb.	...	...	...	98
Coffee	...	...	...	...	103	cwt.	...	...	...	241
Rice	...	...	...	...	109,158	lb.	...	...	...	487
Tobacco leaf dark-fired	...	...	...	...	5,739,514	lb.	...	...	...	167,402
leaf flue-cured	...	...	...	...	1,355,952	lb.	...	...	...	39,549
leaf air-cured	...	...	...	...	1,391,376	lb.	...	...	...	40,582
strips dark-fired	...	...	...	...	2,235,104	lb.	...	...	...	65,191
strips flue-cured	...	...	...	...	893,852	lb.	...	...	...	26,071
strips air-cured	...	...	...	...	871,379	lb.	...	...	...	25,416
Tea	...	...	...	...	11,385,094	lb.	...	...	...	379,502
Cotton (lint)	...	...	...	...	1,140	tons	...	...	...	37,254
Cotton (seed)	...	...	...	...	750	tons	...	...	...	1,875
Fibre (all kinds)	...	...	...	...	1,216,610	tons	...	...	...	6,518
Groundnuts (estimate)	...	...	...	...	451	tons	...	...	...	2,481
Potatoes	...	...	...	...	85,496	lb.	...	...	...	344
Soya Beans	...	...	...	...	1,759,282	lb.	...	...	...	3,142
Rubber	...	...	...	...	132,900	lb.	...	...	...	2,769
Strophanthus	...	...	...	...	14,219	lb.	...	...	...	1,422
Beeswax	...	...	...	...	11,398	lb.	...	...	...	475
Grapefruit	...	...	...	...	19,298	lb.	...	...	...	156

The most noticeable increases during the year were in tea, fibres and soya beans. The figure for fibres includes sisal prepared in 1938.

There was a decrease in the exports of tobacco and cotton. In the case of tobacco this was largely due to unfavourable weather conditions but in addition there was a drop of 18.8% and 10.3% in the number of registered native-growers in the Southern and Northern Provinces respectively.

Unfavourable weather conditions, accompanied by serious development of bacterial boll-rot, were mainly responsible for the decrease in the export of cotton lint.

TOBACCO.

6. In the case of European grown types there was a slight increase in production of both flue and fire-cured over, but a considerable drop in air-cured below, the 1938 figures. On the other hand there was an increase of over a million and a half pounds in native air-cured tobacco. The actual figures are:—

PRODUCTION.

<i>European</i>				lb.
Flue-cured	...	...	...	3,070,816
Fire-cured	...	...	...	155,120
Air-cured	...	...	..	178,192
				3,404,128
<i>Native</i>				
Fire-cured	...	...	...	7,903,242
Air-cured	...	...	...	3,196,359
				11,099,601
			Total	14,503,729

EXPORTS.

		Amount lb.		Value £
Flue-cured	...	2,249,804	...	65,620
Fire-cured	...	7,974,618	...	232,593
Air-cured	...	2,262,755	...	65,998
		12,487,177		364,211

7. As the monthly Empire Tobacco Report from Messrs. Frank Watson has been discontinued during the war it is not possible to give figures of the stocks of Nyasaland tobacco on hand at the end of the year. The latest available information on this point is that on June 30th stocks were 27,129,836 lb. being 2 2/12th years supply on the usual basis.

8. The number of registered Native Trust Land growers and the average amount of tobacco produced per grower were as follows:—

<i>Northern Province</i>				<i>Southern Province</i>			
34,792	...	121 lb.	...	8,781	...	152 lb.	

9. The amount of tobacco purchased from growers on Native Trust Land and Private Estates respectively are shown below.

<i>Northern Province</i>				<i>Southern Province</i>			
lb.				lb.			
Native Trust Land	...	...	4,213,548	...	...	1,338,451	
Private Estates	...	...	4,272,337	...	...	1,275,265	
<u>8,485,885</u>				...	...	<u>2,613,716</u>	

10. The rainfall was favourable to planting during December and January but was excessive with little sun during February and the first three weeks of March. Though more favourable weather was experienced later, crops of low yield and quality resulted in nearly all districts.

11. Most of the crop, both flue-cured and dark-fired, the latter from unalienated Native Trust Land being handled by the Native Tobacco Board, was sold by auction on the licensed auction floor at Limbe. The quantities of the different types sold and the average prices were as follows:—

Amount			Average Price	
Fire-cured	...	5,064,765 lb.	...	4.48d.
Flue-cured	...	2,924,097 lb.	...	6.62d.
Air-cured	...	422,308 lb.	...	4.13d.

COTTON.

12. *Native.* With the exception of the North Nyasa district where there was a slight increase, the numbers of growers compared with 1938 dropped considerably throughout the Protectorate, the decrease being from 30% to 35% in the Central Areas and 48% in the Lower River.

The Lower River Trust Land crop of 1,160 tons of seed cotton was the lowest since 1927, and generally throughout the Protectorate the season was a very poor one for cotton production. Weather conditions were conducive to the development of bacterial boll-rot which in some parts practically wiped out the main crop. In the Lower River the floods of the last three years have completely inundated the most fertile lands and much of the population has had to move onto soils that would not normally be cultivated in cotton. It is computed that some 120,000 acres of the best agricultural land, embracing the areas from which the best cotton crops were previously obtained, are now no longer under any cultivation and have produced nothing for the past two years.

As a result of all these factors there was a considerable decrease in production in all districts.

Details of Trust Land and Private Estate seed cotton production by districts were as follows:—

<i>Southern Province.</i>				<i>Northern Province.</i>			
Lower Shire	...	455 tons	...	Ncheu	...	105 tons	
Chikwawa	...	829 "	...	Dedza	...	136 "	
Cholo	...	73 "	...	Dowa	...	489 "	
Mlanje	...	1 "	...	Kota-Kota	...	277 "	
Blantyre	...	6 "	...	North Nyasa	...	242 "	
Central Shire	...	119 "	...				
Upper Shire	...	101 "	...		...	1,249 "	
South Nyasa	...	21 "	...				
<u>1,605</u>							

The total of 2,854 tons of which private estates produced 509 tons, shows a decrease of approximately 60 per cent. on the previous year's figure.

Prices averaged .930d. for No. 1 ; .441d. for No. 2 and .228d. for No. 3.

The total sum paid out to Native Trust Land growers was £17,608.

The progressive improvement in the crop from south to north is shown in the following table.

Area	Yield/acre lb.	Production Factor per lb. seed issued	% sold as No. 1
Lower River	121	1.4	70
Blantyre and Central Shire ...	174.7	1.5	73
Central and Northern Areas	250	6.4	89
North Nyasa, approx. ...	329	5.4	96.4

13. *European.* European production of seed cotton amounted to some 35 tons.

TEA.

14. Acreage, yield and export have been given above. The acreage allowed to the industry as a whole at the end of the first period of restriction on 31st March, 1938 was 17,700. During the second period the country is allowed to extend to 20,200 acres and there is no doubt but that the full amount will be planted. The season was, fortunately, an extremely good one for the tea crop. Between July and December yields of over 550 lbs. of made tea per acre were quite common and the November-December yields on many estates have had no equal in that period. Usually by the end of April the crop begins to drop rapidly but this year, as late as June, the bushes were flushing extremely well and the increased yield was enhanced by the introduction of an extended pruning cycle on fresh estates.

TUNG OIL.

15. A further planting of 2,333 acres brought the total acreage under this crop, mainly *Aleurites montana*, to 4,401 acres. It has not yet been possible to make any extraction of oil for export.

16. Figures for the minor crops will be found in the tables above.

NATIVE FOOD CROPS.

17. On the whole the season was not a good one for the maize crop, owing to excessive rainfall and lack of sunshine, particularly in the Southern Province, but there was an improvement on the 1938 season.

In the Northern Province food crops generally were fair, and local shortages could be remedied from adjacent localities.

Plantings of groundnuts increased and over local requirements some 410 tons surplus was sold in the Ncheu-Dedza-Lilongwe highland areas for £1,696 4s. 8d. (kernels).

Rice production increased considerably in the Kota Kota district and 1940 should see a reasonably thriving local industry in this crop.

Until the native becomes more provident and makes sure that he retains adequate food supplies for himself and his family before selling or converting into beer what he thinks—or hopes—to be a surplus, the usual shortage of foodstuffs before the harvesting of the new crop will occur annually, however good the previous crop may have been.

PESTS AND DISEASES.

18. *Locusts*—The red-winged locust, *Nomadacris septemfasciata*, Serv., continued to be the only species reported in the Protectorate. Monthly reports were sent to the headquarters of the International Locust Bureau, London. Hopper bands were very much scattered and occurred from south of Port Herald in the Lower Shire district to Golomoti in the Dedza district, with main concentrations in the centre of the Lower Shire district, parts of the Chikwawa district and in the Central Shire and Bwanje valleys.

Food gardens in the three former areas suffered more than elsewhere but in the Lower Shire district many gardens of sorghums, where spraying operations were carried on, made a remarkable recovery and were not the total loss that was anticipated at one time.

The number of flying swarms (13th generation since the beginning of the cycle) that developed was small but there was a reinvasion from the south and east in November, and by December swarms had entered districts such as Kota Kota and West Nyasa, which had been free for some years.

Although egg-laying began in November, a month earlier than in the previous three years, and was spread over a wide area, the resulting development of hopper bands was surprisingly small and scattered, and considerable destruction of them by beating and spraying was accomplished by the end of January, 1940, and very little loss of food crops was recorded.

19. *Crop Pests*—The most important record during the year was the discovery of Pink Boll-worm (*Platyedra gossypiella*, Saunders.) in the Lower River cotton crop towards the very end of the season. Hitherto only known from the North Nyasa district, this discovery was disconcerting. Further investigation seemed to prove that though somewhat more widespread in distribution than was at first thought to be likely, there could be little doubt that the pest was of comparatively recent introduction into this southern part of Nyasaland, and that it had come from neighbouring territory, where, unfortunately, no 'dead season' between crop and crop is rigorously enforced and where, it has since been learnt, infected cotton seed had been moved about, indiscriminately, for some years past.

Although it would appear possible to keep the pest within reasonable bounds by the enforcement of a rigorous 'dead season', such a measure should be carried out with equal strictness on both sides of the international boundary.

Red Boll-worm (*Diparopsis castanea*, Hmps.) and Cotton Stainers (*Dysdercus* spp.) continued to be studied by the Insect Pest Control staff of the Empire Cotton Growing Corporation, and much information is being obtained. But it is certain that some years of work, without interruption, will be necessary before any practical method of dealing with these two major cotton pests can be suggested.

Various insect pests of tea and tung nut, among other crops, have been studied by the Entomologist, and in the two former cases articles were published in certain numbers of the Nyasaland Tea Association Quarterly Journal.

20. *Crop Diseases*—The serious outbreak of *Bacterium malvacearum*, E.F.S., in the cotton crop has already been mentioned.

Diseases of other crops were under study by the Agricultural Officer in charge of the Mlanje Experimental Station, Mr. A. P. S. Forbes, and though valuable information was being obtained the work was interrupted by the outbreak of hostilities. Most of his report, however, will be found in the Nyasaland Tea Association Quarterly Journal.

ADVISORY BODIES AND POLICY.

21. The Native Welfare Committee continued to deal with matters affecting the native population and eight meetings were held during the year. The Agronomic Development Sub-committee of the above committee held five meetings.

The Native Tobacco Board and the Tobacco Control Board continued to deal with the sales of tobacco on the auction floor, and the former board was successful in assisting to produce much leaf suitable for the West African market.

Co-operation is maintained between the Department and the Jeanes Training School and its Community Workers, particularly in such matters as model peasant holdings.

22. The general policy of the Department, as set out in detail in the 1938 Annual Report, was continued. Particular attention is paid to the subject of soil conservation and improvement of fertility, and considerable progress has been made. In the extension of such work there is the serious problem that much of the cultivation is carried out by women and children, who naturally adopt the easiest method of preparing the land. In congested districts, where cultivation extends on to steep slopes, the dragging down of the soil into heaps is comparatively simple and in such areas improved methods and anti-erosion measures are difficult, if not impossible, to achieve.

23. The Commission appointed locally to enquire into the tobacco industry issued its report during the year.

24. The staff of the Empire Cotton Growing Corporation continued to work on all aspects of the cotton crop.

PART II.—WORK OF THE DEPARTMENT.

25. Some disorganisation of the staff and the work of the Department inevitably occurred on the outbreak of hostilities.

26. It is with great regret that I have to record the death of Mr. B. C. G. Charles, C.D.A., A.I.C.T.A., Agricultural Officer, while on leave in England.

27. Mr. R. W. Kettlewell, B.Sc., A.I.C.T.A. was seconded for duty with the Nutrition Survey in the Kota Kota district until November when he was relieved by the local appointment of Mr. H. V. Newby, B.Sc., N.D.A.

28. Mr. C. W. R. McCreary, M.Sc., A.I.C.T.A., was invalided out of the service in September.

29. Two new Agricultural Officers, Messrs. H. W. T. Webb, B.Sc. Agric., A.I.C.T.A., and C. J. Dawkins, B.A., B.Sc., A.I.C.T.A., joined the department towards the end of the year and were posted to the Southern and Northern Provinces respectively.

30. The Director was transferred to Kenya in December, the position being temporarily filled by the Assistant Director, Captain A. J. W. Hornby, M.B.E., B.Sc., A.I.C.

31. The following members of the staffs of the Department and the Native Tobacco Board proceeded on military duty:—

A. B. Cormack, Agricultural Assistant
J. E. L. Fenner, Temporary Agricultural Supervisor
N. R. Bartlett, Clerk
G. D. N. Bartlett, Native Tobacco Board
F. F. Smithyman, Native Tobacco Board
J. W. Guise, Native Tobacco Board
G. J. Stacey, Native Tobacco Board
W. Kirk, Native Tobacco Board
J. C. Onions, Native Tobacco Board

32. In May the Director of Agriculture was appointed Food Controller and Controller of Essential Supplies with an advisory committee drawn from the European and Indian trading communities to assist him. Powers were given to all Agricultural Officers and Supervisors to control stocks and supplies in their districts, collect returns and information as required by the Food Controller, supervise price control and to deal with local difficulties.

In October and December legislation was introduced to control both wholesale and retail prices and it was found necessary to appoint the Assistant Chemist, Dr. I. W. M. Armstrong Black, to deal with this work as a whole time job. Profits, customary before the outbreak of war, are retained on pre-war landed costs, but the profits on extra landed costs are controlled.

33. It was hoped to open the Agricultural School at Makwapala in September with Mr. A. B. Cormack in charge, but as completion of the buildings and fittings was delayed by the outbreak of hostilities and Mr. Cormack joined the military forces, this was found to be impossible. Considerable re-arrangements had to be made with a view to opening in 1940.

34. A scheme for establishing a Tung Nut experimental station in the Cholo district, with Mr. C. C. Webster in charge, to be financed by the Colonial Development Fund, was prepared and it is hoped that it will come into existence next year.

EXPERIMENTAL STATIONS.

35. The Department and the Native Tobacco Board continued experimental and investigational work in progress at the stations at Zomba, Lilongwe, the tea research station at Mlanje, the sub-stations at Port Herald, Masambanjati, Makwapala, Chimvua, Nchenachena and Karonga, and on smaller plots at Neno, Dedza and Kota Kota.

36. *Groundnuts*—Comparison of indigenous spreading types with imported bunch types has given rather conflicting results. At Port Herald there appeared to be little difference in yields but both at Dedza and at Karonga yields of the local types were far in excess of the imported kinds, but the latter are gaining favour in North Nyasa on account of their quality and are replacing the indigenous types on the lighter sandy loams of the lake shore area in the Kota Kota district.

37. *Rice*—Investigational work was carried out in the Kota Kota rice areas and of ten imported Burman non-glutinous varieties only two, C24-71 and C24-102, produced sufficient seed for further work to be undertaken. Four local varieties studied in detail gave the following milling results:—

Type	% Loss	% No. 1		% No. 2		Litre weight in grams						
						Paddy		Rice		Paddy from mass		field selections
Maliya	...	86	...	49	...	15	...	578	...	889	...	593
Jojo	...	30	...	58	...	12	...	630	...	883	...	660
Mwanamgeni	...	35	...	48	...	17	...	631	...	861	...	652
Faya	...	32	...	59	...	9	...	606	...	859	...	629

38. *Wheat*—In the Dedza district an unfavourable season with severe cold spells and ground frosts, coupled with a high incidence of Black Stem Rust (*Puccinia graminis*), did not permit very accurate comparisons between the different types studied to be made. In the Bembeke area the "Bembeke" local wheat (of Pusa origin) appeared to be less resistant to rust than Union 53 (ex South Africa) which was also a superior yielder, but in the more western part of Dedza the local variety appeared to be more suitable. Of seven other imported varieties Sabanero (ex Kenya) and B.I.C. 5P. (ex Southern Rhodesia) were both rust resistant and promising yielders.

In the Neno area, of 12 varieties tested Sabanero was the best, though taking 181 days to mature, with Australia 26A (ex Kenya) the second best taking 116 days to maturity, whereas Union 57 only required 99 days.

39. *Tea*—Among other work investigation into the actual yield per bush in fields of different jat, age and intensity of manuring was carried out. What information is available will be published in the Nyasaland Tea Association Quarterly Journal.

40. *Coffee*—Both at Masambanjati and at Nchenachena the more heavily shaded plots or those with a thick ground mulch of forest foliage during the dry season gave the best yields and retained their vigour.

41. *Cassava*—Some twenty-two local types have been distinguished and these together with a number of varieties imported from Amani have been under observation for a year at the Mlanje station, growing in contact with mosaic diseased plants.

Four of the local types showed some resistance to the disease. The vernacular names of these are:—*Kapantha*, *Mbukuni*, *Biti Sumani*, and *Phomuphomu* with numerous synonyms.

Nine introduced types appeared to be resistant:—*Mangi* (ex Java), *Malinde* and *M. 13* (ex Kenya), *Korogwe* (ex Tanganyika), *Sellier*, *Turkey claw*, and *Mame e' enfant* (ex Trinidad), *Ankrah* and *Calabar* (ex Gold Coast).

Cuttings of all the above have been distributed to representative areas for further observations to be made.

Three interesting points of information in connection with mosaic disease of cassava have been, tentatively, elicited:—

- (1) Altitude appeared to have no effect on the incidence and intensity of the disease.
- (2) Intensity of infection appears to be inversely proportional to the rainfall.
- (3) There is a higher incidence of mosaic in plants grown on sandy soil than in those on sandy loam or clay loam soils.

This suggests that in order to carry out a searching resistance test the variety under consideration should be grown among severely infected plants in a low rainfall area and in a predominately sandy type of soil.

TUNG.

42. The following is taken from the report of Mr. C. C. Webster:—

"Only a small amount of experimental work with tung oil has been possible during the year as this has had to be done in spare time when pressure of other work permitted.

BUDDING. Small experiments were made with a total of about 250 seedling stocks of *A. montana* but no work has yet been done with *A. fordii*. The method of budding commonly employed for rubber is entirely satisfactory with *A. montana* in Nyasaland and should give at least 95% of successes with reasonable care. Budding may be done as soon as growth recommences after the dormant period, which is usually over some weeks before the rains begin, and may be continued until the approach of the following dormant period. The best results are obtained by budding as early as possible so that the scion has the whole of the rainy season in which to grow. Buddings may be opened 12 to 14 days after budding and the stocks cut back to 4 to 6 inches above the bud a week later. Simple cutting back forces the bud out quite satisfactorily and there is no need for preliminary bending or ring-barking. Budded plants can also be stumped and transplanted.

TOP-WORKING. The same method of budding can also be used for the top working of trees up to at least six years old. A few male trees have been worked in this manner with wood from high yielders in order to try and convert them to profitable bearing trees. No other methods of top-working have yet been tried.

FLOWERING OBSERVATIONS. Observations on flowering were made on 121 eight year old trees of *A. montana* at the Zomba Experimental Station, on 45 trees of the same age and species at Namadidi, and on 62 *A. fordii* trees on Zomba Plateau, but owing to pressure of other work these observations could not be completed in as detailed a manner as had been intended. The main points noticed were:—

(a) *A. montana*. The vast majority of the trees are either predominantly male or predominantly female, there being very few which bear flowers of both sexes in anything approaching equal numbers.

Approximately 39% of the trees at Zomba have less than 5% of female flowers and therefore bear little or no fruit. At Namadidi there were 41% of such trees. The proportion of these unprofitable trees in any plantation of *A. montana* established from unselected seed is probably fairly constant around 40% as it has been reported as 45% from Indo-China and 42% from Burma.

Trees which bear flowers of both sexes do not usually bear both at the same time. Such trees have a male phase followed by a female phase or *vice versa*.

Some of the heaviest bearing trees in the plot produced all their female blossom at the beginning of the flowering season and when the only male blossom present was that on a few of the male trees. This would appear to indicate the advisability of leaving a proportion of males, including some early flowering individuals, in any plantation where budding is being extensively practised.

(b) *A. fordii*. The flowering of the *fordii* plot was not altogether normal and therefore little can be said about it. The inflorescences almost always contain flowers of both sexes. Out of 347 clusters examined only 11 (3.1%) did not contain female flowers. No tree out of the 62 examined did not have a fair proportion of flowers of both sexes and there is no indication of a proportion of the trees being unprofitable on account of being predominantly male, although there were, of course, a number of poor yielders."

43. *Tobacco*—Apart from the normal work of maintaining supplies of pure seed stocks and manuring experiments, particular attention was paid to selection of plants of the Narrow Leaf Western type with a view to producing a leaf suitable for the West African market, as it is considered that this variety of tobacco is most suited to local conditions.

44. *Cotton*—A detailed account of the work carried out by the Empire Cotton Growing Corporation staff at the various stations will be found in the Progress Reports 1938-39 of the Corporation. Definite advances are claimed at the main station, Domira Bay, in the problem of reconciling yield and quality, and a superior strain, the re-selected "920", has been made available to bulk for commercial trial.

The past two seasons have shown that, with the very small margin of safety due to the short season in which cotton may be grown there, the Lilongwe area is a very doubtful proposition for commercial cotton, and work at the high-level sub-station has, therefore, been abandoned.

In the North Nyasa district the important decision was at last made to eliminate entirely the rain-grown crop and concentrate on the crop grown on flood land later in the year, so that an unnecessarily long planting and growing period would be abolished and a truly effective 'dead season' eventually be ensured. The results are already impressive as may be seen from the table in paragraph 12.

DISTRICT WORK.

45. *Demonstration Plots*—The importance and value of these small plots, established throughout the districts, is becoming increasingly evident. They are worked on lines, and with materials that can be employed by the African cultivator himself, there is no "fancy" work, and it is encouraging to find very definite interest being taken in them, not only by the near-by population but also by people living some considerable distance away, so that some of the methods employed on them are slowly filtering into surrounding gardens. On occasion surprise has been expressed that the crops produced on these plots have been obtained from purely local native seed stocks. It is also gratifying that some Native Authorities ask for more of these plots to be started in their districts and are prepared to finance them from Native Treasury Funds, more particularly in the Northern Province.

46. *Soil Conservation*—All possible means and measures are utilised to encourage this work and Native Agricultural Instructors with road tracers are continuously marking out gardens. Response is slow but some progress is made each year. Part of what was accomplished in 1939 is shown by the following figures, but they by no means give a complete picture of the work done.

South Nyasa—355 acres protected by contour drains.

Ncheu—237 acres protected by contour drains and a further 6,000 acres changed from "matutu" to ridge cultivation.

Dedza—80 acres protected as above and a further 3,000 acres provided with storm drains.

Kota Kota—565 acres protected by contour drains.

North Nyasa—2,000 acres converted to contour ridging.

47. *Land Settlement Schemes*—The scheme developed in the Bwanje Valley, though showing some signs that there was a general improvement in the standard of agriculture, received an unfortunate check later in the year by reason of unavoidable staff changes.

A new one was started on 700 acres of a reverted European estate near Chiromo in the Lower Shire district, where two villages, from a flooded area were established.

The possible establishment of small holdings in suitable sites in the Mzimba and North Nyasa districts is being considered and planned.

48. *Nutrition*—A considerable quantity of various fruit trees have been issued and planted in villages, and general encouragement for greater cultivation of these and vegetables has been given throughout the Protectorate.

SOIL SCIENCE AND CHEMISTRY.

49. The work of the Assistant Chemist was interrupted towards the end of the year by the necessity of employing this officer on Food and Price Control work. In the early part of the year, however, in addition to normal miscellaneous work on soils, fertilizers, analyses of field experiments and assistance rendered to the Veterinary Department, a detailed comparison of the fertility of the soils at the tobacco experimental stations at Likuni and Chimvua in the Lilongwe district, begun in 1938, was continued. Interesting results were obtained and the Assistant Chemist's report is given below:—

“In addition to considerable laboratory work on these soils, the problem was approached from the field side, when yield figures, from duplicate tobacco experiments at each station, were obtained. The experiments were of the factorial type involving the three factors, nitrogen, phosphorus, and potash at two levels each and with complete confounding of the 2nd order interaction.

The results of the experiments were as follows:—

(a) At Likuni, a significant response to nitrogen was the only positive result obtained.

(b) At Chimvua, no significant response to any one fertiliser was shown but the combination of nitrogen and phosphate more than doubled the yield. A detailed analysis of the data indicated that the effect of phosphate was to increase the number of plants reaching maturity and the effect of nitrogen was to increase the yield per plant.

It is too soon to state any conclusions, but the indications are that the lack of fertility at Chimvua is probably due rather to the unavailability of phosphate than an actual deficiency. The laboratory determinations of total phosphate did not reveal any essential difference between Likuni and Chimvua soils and it is hoped eventually to extend the work to available phosphates.”

PART III.—SUMMARY OF LEGISLATIVE CHANGES.

50. The Tea Ordinance, 1934, was amended in order to deal with the increased acreage allotted to Nyasaland (see para. 14), and the extension of the restriction period to 1943.

The Tea Cess Ordinance, 1935, was amended to permit of the increase of the cess on exported tea to a maximum of 2/-per 100 lbs. or part thereof.

The Marketing of Native Produce Ordinance, 1938, came into effect and was slightly amended in order to cover the terms of exclusive buying licences for any new crops requiring to be fostered or special technical advice.

The Plant Pests and Diseases Ordinance, 1924, was amended so as to control the importation of Citrus from countries likely to be infected with canker, and some other plant introductions were prohibited.

The Tobacco Pest Rules, 1939, dealing with all pests of cured tobacco were introduced in place of the Tobacco Beetle Rules, 1926.

ACKNOWLEDGMENTS.

51. In a year of combined adverse weather conditions and considerable political difficulties necessitating rapid postings, equally rapid changes in staff dispositions, and some disorganisation of normal routine, it is gratifying to record the whole-hearted way in which every member of the Department and the associated bodies, both technical and clerical, have carried on, not only with their normal duties but also with any extra work that had to be undertaken.

The steady and helpful co-operation of the Administration with all sides of the Department's activities is of great assistance to the progress and welfare of the people of the country.

In this condensed report it has not been possible to do full justice to the work done during the year by everyone interested in the agriculture of Nyasaland, but it is confidently believed that the same good work will be pursued whether or not the records appear in print.

A. S. RICHARDSON,
Director of Agriculture.

Agricultural Statistics.

EUROPEAN AGRICULTURE.

District.	Total acre- age under cultiv- ation.	TOBACCO.								TEA.		COFFEE.	
		Total.		Fire-cured.		Flue-cured.		Air-cured.					
		Acres.	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.	
Lower Shire ..	212	16	80	...	...	...	...	16	80	...	...	...	...
Chikwawa ...	193	135	300	...	...	135	300	...	...	...	...	...	...
Central Shire ..	245	162	331	40	41	122	290	...	...	...	...	...	...
Cholo ..	20,883	2,569	5,812	...	...	2,569	5,812	...	...	8,989	35,836	33	22
Mlanje ..	11,330	938	2,301	98	218	765	1,889	75	194	9,028	65,392	45	60
Blantyre ..	2,725	1,789	6,600	...	...	1,783	6,580	6	20	...	...	143	94
Chiradzulu ..	721	443	1,590	10	44	408	1,475	25	71	...	...	...	...
Zomba ..	1,685	1,095	2,877	46	162	1,049	2,715	...	...	...	...	2	2
Upper Shire ..	288	88	230	...	...	73	178	15	52	...	...	...	...
South Nyasa ..	1,611	1,318	4,685	...	...	1,237	4,581	81	104	...	...	1	1
Ncheu ..	777	690	1,564	...	...	460	915	280	649	...	...	...	...
Dedza ..	465	326	1,301	...	...	280	1,086	46	215	...	...	1	...
Fort Manning ..	514	445	1,274	275	800	160	454	10	20	...	...	...	...
Lilongwe ..	904	332	1,282	20	49	236	1,060	76	173	...	...	1	...
Dowa ..	2,923	21	84	18	71	...	...	3	13	...	...	...	...
Kota Kota ..	12	...	...	...	...	...	...	...	...	...	...	1	1
Kasungu ..	1	...	...	...	...	...	...	...	...	...	...	...	...
Mzimba ..	112	...	...	...	...	...	...	...	...	1	...	84	39
West Nyasa ..	1,443	...	...	...	...	...	...	...	...	...	...	...	...
North Nyasa ..	112	40	83	...	...	40	83	...	...	...	...	54	18
Total ..	47,156	10,407	30,394	507	1,385	9,317	27,418	583	1,591	18,018	101,228	365	238

NOTE:—TEA : Acreage in plucking 1939 was 15,824. COFFEE : Acreage in bearing 1939 was 224.

EUROPEAN AGRICULTURE—CONTINUED.

District.	SISAL.		COTTON.		RUBBER.		CHILLIES AND CAPSICUMS.		MAIZE.		WHEAT.	
	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.
Lower Shire ...	1	...	25	44	...	...	...	...	143	1,743	1	5
Chikwawa ...	...	...	4	2	...	...	...	...	2	40	2	3
Central Shire ...	...	...	...	...	...	...	...	...	...	...	...	...
Cholo ...	1,433	4,520	...	...	...	...	4	6	181	1,491	15	57
Mlanje ...	...	...	...	...	...	...	14	10	156	960	...	...
Blantyre ...	1	2	...	...	...	...	2	4	103	1,316	2	6
Chiradzulu ...	...	...	...	...	...	...	20	43	47	292	...	...
Zomba ...	...	...	...	...	...	...	...	...	126	1,372	2	2
Upper Shire ...	...	...	42	73	...	...	...	...	114	351	...	...
South Nyasa ...	...	...	...	...	...	...	...	...	103	1,530	...	...
Ncheu ...	...	...	1	3	...	...	...	...	55	554	...	...
Dedza ...	...	...	...	...	...	...	10	20	65	1,013	6	30
Fort Manning ...	...	...	...	...	...	...	...	...	6	90	...	...
Lilongwe ...	...	...	10	1	...	...	...	...	160	1,601	24	65
Dowa ...	...	...	65	95	...	...	...	...	2,046	28,656	5	10
Kota Kota ...	2	6	...	...	...	...	...	...	2	20	5	50
Kasungu ...	...	...	...	...	...	...	...	...	...	...	...	...
Mzimba ...	...	...	...	...	...	...	...	...	...	...	5	25
West Nyasa ...	...	...	...	...	1,360	1,239	...	...	100	1,920	...	...
North Nyasa ...	...	...	...	...	...	...	...	...	14	210	1	2
Total ...	1,437	4,528	147	218	1,300	1,239	50	83	3,417	43,159	68	255

EUROPEAN AGRICULTURE—CONTINUED.

Name of district.	LEGUMES.							OIL SEEDS.					
	Total.		For food.		For fodder.		For green manure	Total.		For crushing.		For food.	
	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.	Acres under crop.	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.
Lower Shire ...	17	45	17	45	...	...	...	7	30	...	...	7	30
Chikwawa ...	15	9	15	9	...	...	...	...	...	...	...	...	...
Central Shire ...	67	254	35	254	...	...	32	...	...	...	...	...	...
Cholo ...	580	1,111	84	337	11	774	485	3,036	11,717	3,032	11,713	4	4
Mlanje ...	771	260	135	260	...	...	636	5	...	...	...	5	...
Blantyre ...	616	4,290	97	480	353	3,810	166	1	5	...	...	1	5
Chiradzulu ...	118	2,005	3	5	100	2,000	15	14	59	6	14	8	45
Zomba ...	238	407	124	326	19	81	95	28	181	15	81	13	100
Upper Shire ...	30	49	13	9	2	40	15	7	11	...	...	7	11
South Nyasa ...	188	45	38	45	...	...	150	...	...	...	...	...	...
Ncheu ...	8	30	6	30	...	...	2	1	3	...	...	1	3
Dedza ...	28	184	16	144	2	40	10	3	30	...	...	3	30
Fort Manning ...	48	62	6	62	...	...	42	5	50	...	...	5	50
Lilongwe ...	306	651	77	622	3	29	226	20	106	1	...	19	106
Dowa ...	37	12	4	12	...	...	33	742	2,272	...	...	742	2,272
Kota Kota ...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kasungu ...	...	...	...	...	...	...	...	1	5	...	...	1	5
Mzimba ...	2	5	2	5	...	...	...	2	20	...	...	2	20
West Nyasa ...	24	620	24	620	...	...	...	19	180	...	...	19	180
North Nyasa ...	...	...	...	...	...	...	...	3	30	...	...	3	30
Total ...	3,093	10,039	696	3,265	490	6,774	1,907	3,894	14,699	3,054	11,808	840	3,891

EUROPEAN AGRICULTURE—CONTINUED.

Name of district.	TUNG OIL.		FRUIT TREES.		NUT-BEARING TREES.		MISCELLANEOUS.		Woodland Artificially Established
	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.	Acres.
Lower Shire ...	...	...	2	4	...	...	...	...	10
Chikwawa ...	...	...	32	96	...	...	3	4	7
Central Shire ...	...	...	16	64	...	...	...	...	26
Cholo ...	3,748	122	102	294	167	...	26	166	4,328
Mlanje ...	350	22	21	411	2	...	...	...	3,452
Blantyre ...	50	...	18	35	...	...	...	...	4,118
Chiradzulu ...	76	...	3	4	...	...	...	...	1,228
Zomba ...	150	66	8	25	17	...	25	...	1,228
Upper Shire ...	1	...	6	59	...	...	...	...	32
South Nyasa ...	...	...	1	3	...	...	...	...	408
Ncheu ...	...	...	16	69	...	...	6	142	232
Dedza ...	...	...	24	269	...	...	2	16	271
Fort Manning ...	...	...	10	18	...	...	...	...	133
Lilongwe ...	12	...	25	125	...	...	14	4	2,307
Dowa ...	...	...	2	20	5	...	...	...	282
Kota Kota ...	...	...	2	30	...	...	...	...	42
Kasungu ...	...	...	...	...	...	...	...	...	6
Mzimba ...	14	...	4	12	...	...	...	...	114
West Nyasa ...	...	...	...	...	...	...	...	...	4
North Nyasa ...	...	...	...	...	...	...	...	...	13
Total ...	4,401	210	292	1,538	191	...	76	332	18,241

NATIVE AGRICULTURE.

District.	Seed Cotton	Rice	Wheat	Ground- nuts	Tobacco	Maize	Peas and Beans
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Lower Shire	455				...		
Chikwawa	829				...		
Central Shire	119				...		
Cholo	73				31		
Mlanje	1				417		
Blantyre	6				32		
Chiradzulu	...				293		
Zomba	...				315		
Upper Shire	101				75		
South Nyasa	21				4		
Ncheu	105				241		
Dedza	136				109		
Fort Manning	...				308		
Lilongwe	...				2,262		
Dowa	490				666		
Kota Kota	277				159		
Kasungu	...				43		
Mzimba	...				...		
West Nyasa	...				...		
North Nyasa	242				...		
Total	2,855				4,955		

NOTE.—Maize is the staple foodstuff in most districts; groundnuts, rice, wheat, beans and various other crops are also grown by natives for local consumption, but it is impossible to make an accurate estimate of the quantities of these crops.

The above tobacco and cotton figures represent the quantities purchased in each district, and do not accurately reflect the production by districts, as many natives grow their tobacco and cotton in one district and sell in another.

LIVESTOCK OWNED BY NATIVES AT 31ST DECEMBER, 1939.

District.	Cattle.	Sheep.	Goats.	Pigs.
Lower Shire	367	3,683	9,800	5,319
Chikwawa	183	1,500	8,000	6,000
Central Shire	1,245	654	6,012	504
Cholo	111	927	5,676	4,958
Mlanje	953	2,800	13,400	9,700
Blantyre	2,872	3,814	9,603	5,877
Chiradzulu	4,611	1,413	10,527	12,133
*Zomba	1,171	1,804	4,270	1,464
Upper Shire	107	2,500	4,500	100
South Nyasa	220	2,820	5,100	65
*Ncheu	15,059	2,483	1,373	879
†Dedza	26,868	3,317	31,128	411
Fort Manning	2,547	1,624	9,994	7,831
†Lilongwe	41,809	3,947	39,797	1,212
Dowa	21,000	5,000	30,000	2,000
Kota Kota	2,200	1,400	34,500	750
Kasungu	2,395	1,390	2,080	175
Mzimba	31,800	2,850	9,250	720
West Nyasa	2,192	136	1,105	—
North Nyasa	43,403	417	2,268	27
Total	201,113	44,479	238,383	60,125

* 1937 figures.

† 1938 figures.

LIVE STOCK OWNED BY EUROPEANS AT 31ST DECEMBER, 1939.

District.	Cows and heifers.	Bulls.	Oxen.	Calves.	Pedigree cattle.	Horses.	Mules.	Donkeys.	Sheep.	Goats.	Pigs.
Lower Shire ...	491	16	120	219	—	—	—	20	143	99	58
Chikwawa ...	302	6	154	155	—	1	—	—	—	25	—
Central Shire ...	36	4	11	26	—	—	—	8	5	8	63
Cholo ...	1,253	36	794	639	8	33	1	11	371	45	60
Mlanje ...	1,327	30	592	502	4	1	—	1	136	10	48
Blantyre ...	971	26	491	404	47	11	—	8	40	17	163
Chiradzulu ...	506	8	216	193	7	—	—	1	—	—	80
Zomba ...	1,086	28	723	537	10	22	—	22	115	29	61
Upper Shire ...	5	—	5	6	—	—	—	—	3	59	36
South Nyasa ...	116	4	56	57	—	—	—	1	28	115	—
Ncheu ...	293	13	135	92	—	—	—	8	97	—	137
Dedza ...	267	9	137	106	—	—	—	7	15	10	45
Fort Manning ...	95	4	69	52	—	—	—	—	18	—	18
Lilongwe ...	320	44	296	124	7	1	—	39	47	6	171
Dowa ...	13	2	18	3	—	—	—	3	75	11	5
Kota Kota ...	30	4	13	18	—	—	—	1	22	1	—
Kasungu ...	—	—	—	—	—	—	—	—	—	—	10
Mzimba ...	9	3	18	7	—	—	—	3	19	—	24
West Nyasa ...	18	1	9	10	—	—	—	—	2	—	15
North Nyasa ...	126	3	90	48	—	—	—	—	70	—	50
Total ...	7,264	241	4,247	3,189	83	72	1	143	1,206	435	1,044

